SECTION 6
IMPACT ANALYSIS

6.1 INTRODUCTION

6.1.1 A qualitative risk assessment process was used to assess the risk to public safety and human environment associated with UXO at the 312-acre area. This process is known as an Impact Analysis. The purpose of the Impact Analysis is to determine qualitatively the level of UXO safety risk found in an area based on the type of OE believed to have been used in an area and the known or anticipated land use.

6.1.2 The Impact Analysis was performed for the 312-acre area only as no OE or OE-related items were found at the 11-acre parcel during the field investigation. In accordance with current DoD policy, if an OE investigation is conducted of an area and no OE or OE-related scrap is recovered from the site during that investigation, then the No Further DoD Action Indicated (NDAI) alternative will be used for that area with no need for any further analysis.

6.2 DEFINITION OF IMPACT ANALYSIS FACTORS

6.2.1 Introduction

6.2.1.1 The potential risk posed by UXO at a site may be characterized qualitatively by evaluating five components:

- the type of OE believed to have been used at the site,
- the density of the UXO believed to exist at the site,
- the number of people using the site,
- the type of activities performed by those people at the site, and
- the accessibility of the site to the general public.

6.2.1.2 By performing a qualitative evaluation of these five components an overall evaluation of the safety risk posed by UXO remaining at the site may be obtained. The five factors identified above are further defined in the following paragraphs. The application of these factors to the 312-acre area is then performed. Conclusions from the application of the Impact Analysis to the 312-acre area are made at the end of this section.

6.2.2 OE Type

The type of OE found at a site impacts the likelihood of a detonation occurring and the severity of the resulting explosion. Both the size of the OE item and its sensitivity are taken into account when determining the level of this risk factor. There are five categories within the OE Type risk factor. The selection of which OE Type risk level is chosen for a site reflects the results of the field investigation as well as the results of archival searches. When multiple categories of OE types are discovered at a site, the highest risk category is used in the Impact Analysis. The categories within this risk factor are defined and presented in order from highest to lowest risk in Table 6.1.

TABLE 6.1
OE TYPE RISK FACTOR DEFINITION

OE Category	OE Impact	Qualitative Risk Level
Category 3	OE that will kill an individual if detonated by an individual's activities	High
Category 2	OE that will cause major injury to an individual if detonated by an individual's activities	High
Category 1	OE that will cause minor injury to an individual if detonated by an individual's activities	Medium
OE Remnants	Pieces or parts that can be identified as having been part of an OE item (category used if only OE remnants were found at the site)	Low
Category 0	Inert OE, will cause no injury	Zero

6.2.3 UXO Density

UXO Density is directly related to the likelihood that an individual will come into contact with UXO. The density is determined from the USAESCH-developed tool *UXO Calculator* and is expressed in terms of UXO/acre. The *UXO Calculator* is a tool that determines the probabilistic UXO density at a site based on the results of the field investigation. See Section 3 for a more detailed discussion of *UXO Calculator*. For this risk factor there are three categories of UXO density. These categories are defined and presented in order from highest to lowest risk in Table 6.2.

TABLE 6.2
UXO DENSITY RISK FACTOR DEFINITION

UXO Density	Qualitative Risk Level
> 5 UXO/acre	High
Between 0.1-5 UXO/acre	Medium
<0.1 UXO/acre	Low

6.2.4 Number of People Using the Site

The number of people using the site also directly affects the likelihood of people encountering UXO. The categories within this risk factor have been defined based on the type of land use found at the site. There are three categories within this risk factor. These categories are defined and presented from highest to lowest risk in Table 6.3.

6.2.5 Activities Performed at the Site

The types of activities conducted at a site affect the likelihood of encountering UXO. There are four categories within this risk factor. This risk factor takes into account the depth at which UXO are primarily found at the site and the type of activities performed there in order to categorize the risk. For example, at a site where UXO is at the surface, all activities that can

impact UXO at the surface are considered activities that

TABLE 6.3
NUMBER OF PEOPLE USING SITE RISK FACTOR DEFINITION

Number of People Using Site	Qualitative Risk Level
Public attraction such as a park, beach, other tourist sites	High
Public has access to land, but not an attraction to the public	Medium
Owners are primary users of land	Low

can have a significant impact. Conversely, if all UXO is located at depths greater than one foot below the ground surface and only surface impact activities are being performed, then the activities are considered to have a moderate or low impact. Table 6.4 presents the definitions of the various categories found in this risk factor.

TABLE 6.4
ACTIVITIES AT SITE RISK FACTOR DEFINITION

Examples of Activities	Depth that Activities Impact UXO	Depth of UXO/Risk Ranking
Child Play, Short Cuts, Hunting, Fishing, Hiking, Swimming, and Jogging, Ranching, Surveying	Surface	0-6”/High 6”-12”/Low >12”/Low
Off-Road Driving, Mountain Biking, Horseback Riding, Motor Biking	Surface	0-6”/High 6”-12”/Medium >12”/Low
Picnicing, Camping, Metal Detecting	Surface/Subsurface up to 1’	0-6”/High 6”-12”/High
Construction, Archaeology, Crop Farming	Surface/Subsurface greater than 1’	0-6”/High 6”-12”/High

6.2.6 Accessibility of Site

The accessibility of a site affects the likelihood of encountering UXO. Physical or natural barriers can limit the accessibility. Natural barriers can include the terrain or topography of the site as well as the vegetation. Physical barriers can include walls and fences that limit the public's accessibility to the site. Both the physical and natural barriers found at a site are considered when scoring this risk factor. There are three categories within this risk factor. These categories are defined and presented from highest to lowest risk in Table 6.5.

TABLE 6.5
ACCESSIBILITY OF SITE RISK FACTOR DEFINITION

Accessibility of Site	Description	Qualitative Risk Level
No Restriction to Site Access	No physical barriers, gently rolling terrain, no vegetation that restricts access, no water	High
Limited Restriction to Site Access	Physical barriers, vegetation that restricts access, water, snow or ice cover, terrain restricts access	Medium
Complete Restriction to Site Access	All points of entry are controlled	Low

6.3 IMPACT ANALYSIS OF THE 312-ACRE AREA

6.3.1 Introduction

Each of the risk factors identified above was evaluated using the data collected during the EE/CA field investigation of the 312-acre area to establish an overall qualitative risk level for the site. A discussion of the application of the risk factors is provided below.

6.3.2 OE Type

The intrusive investigation of the 55 anomalies at the 312-acre parcel recovered one potentially hazardous OE item, one piece of OE-related scrap, and numerous pieces of non-OE-related items. The one potentially hazardous OE item was a fuzed, practice 60mm mortar round. The 60mm mortar round was determined not to contain HE based on the results of the demolition operation performed on the item. A fuzed, practice 60mm mortar round is a Category 1 OE type and is considered a medium risk. The OE-related scrap item is considered less of a risk. Because the highest risk item is used for the risk evaluation, the OE type to be used in this evaluation will be Category 1.

6.3.3 UXO Density

The density of UXO at the 312-acre area was estimated using the *UXO Calculator*. The upper bound of the expected UXO density at the site (assuming a 90% confidence level) is 1.67 UXO/acre. This density equates to a medium density risk.

6.3.4 Number of People Using the Site

The 312-acre area is located in a rural area, but the public does have access to the site. The site is currently owned by the government, however the Ford Lumber and Building Supply Company (Ford) has the right of first refusal to purchase the land following any necessary removal actions. Ford may decide to develop the land following any necessary removal actions. Potential uses of the land by Ford include light industrial and green space. In addition to these potential future land uses, the area may also be used as a public park. Because of the various future land use scenarios that have been put forward for the site, the risk associated with the number of people using the site in the future has been rated as high.

6.3.5 Activities at the Site

The 60mm mortar round found at the site was located at a depth approximately 2 inches below the surface. Any future activities conducted at the site would have a significant impact and thus a high activity risk since other similar OE items could be found within the first 6 inches below the surface. Therefore, this criterion is rated as high.

6.3.6 Accessibility of Site

The site is fenced along the base boundary and thus limits the access of persons to the site. In addition, the site is limited in access by mature trees and areas with free standing water. This site represents a medium risk associated with accessibility of the site.

6.4 CONCLUSIONS

The qualitative safety risk associated with the presence of UXO at the 312-acre area was evaluated based on the five factors defined above. These factors include the type of OE believed to exist at the site, the density of UXO believed to exist at the site, the number of people using the site, the activities performed at the site, and the accessibility of the site to the general population. The results of the evaluations of these factors are presented in Table 6.6. Three of the five factors were rated as a medium risk, while two of the factors were rated as a high risk. When considered together, the evaluation of these five factors produces a medium risk that suggests that some type of response action (e.g., institutional controls or a removal action) is necessary.

TABLE 6.6
SUMMARY OF RISK FACTOR EVALUATION

Risk Factor	Application at 312-Acre Area	312-Acre Area Risk
OE Type	Category 1 OE Type	Medium
UXO Density	1.67 UXO/acre	Medium
Number of People Using Site	Public has access to land, but it is not an attraction to the public	High
Activities at Site	OE found at surface, all activities have high risk impact	High
Accessibility of Site	Limited Access due to fence, mature trees, swampy conditions	Medium